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FINAL PHASE 2 SITE INSPECTION AT AREA OF CONCERN 20 AND DATA GAPS INVESTIGATION AT AREA OF CONCERN 2 NAS FORT WORTH TX

4/1/2001

SCIENCE APPLICATIONS INTERNATIONAL CORPORATIOIN

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NAVAL AIR STATION FORT WORTH JRB CARSWELL FIELD TEXAS

ADMINISTRATIVE RECORD COVER SHEET

AR File Number 695

PHASE II SITE INSPECTION AT AOC 20
AND
DATA GAPS INVESTIGATION AT AOC 2
NAS FORT WORTH JRB, TEXAS

SCOPING DOCUMENTS ADDENDUM

FINAL

U.S. Air Force Center for Environmental Excellence
Brooks AFB, Texas

Contract No. F41624-00-D-8030
Delivery Order No. 0018

APRIL 2001

Comment Response to Technical Review of Draft Scoping Documents for Phase II Site Inspection at AOC 20 and Data Gaps Investigation at AOC 2 NAS Fort Worth JRB, Texas April 2001

Item No.	Page	AFCEE COMMENTS	SAIC RESPONSE
1	WP 1-1	Please add site history data for AOC 2 and AOC 20 to the introduction, including a description of historical processes and their relation to the contaminant plume, previous site investigative/remediation work (if any), and a figure showing the sites	Site history for AOC was added to the introduction and Figure 1-3 showing the sites was included. Historical data for AOC 20 was included in the Work Plan previously submitted for the SI at AOC 20.
2	WP 1-1	Line 17 Please insert the word "the" between "and" and "associated"	Text was revised accordingly
3	WP 1-1	Line 20. Please change the sentence to read *"Some of the* data gaps identified in *United States* Environmental Protection Agency *(USEPA) Region 6* comments *from* the RCRA Facility investigation conducted for AOC 2 in 2000 will be addressed."	Text was revised accordingly.
4	WP 1-1	Lines 32-35. Please delete this section from the report, as it is not necessary	Page WP 1-1, lines 32-35, were deleted
5	WP 2-2	Line 1 Please replace the word "into" with "throughout the"	Text was revised accordingly
6	WP 2-2	Line 24 Please change the sentence to read "Groundwater samples will be collected from soil borings which have been converted to monitoring wells.. ".	Text was revised accordingly
7	WP 2-3/2-5	Please indicate the contamination source locations (AOC 2 and AOC 20) on these and all other figures Also, if possible, please show the southern lobe of the AFP 4 TCE plume on Figure 2-1	Figure 2-1 was revised to show southern lobe of the TCE plume Figure 1-3 was added showing contaminant source locations for AOC 2 Other maps were too cluttered to show source areas
8	WP 2-7	Please show the proposed locations of soil borings/monitoring wells for both AOCs on either of the figures (2-3 or 2-4) or on a separate figure.	Proposed soil boring and monitoring well locations will be selected based on evaluation of seismic survey and electrical imaging results
9	Figure 2-3	Please spell out "Terrace Alluvium" on the first line of the legend	Figure 2-3 was revised accordingly.

Comment Response to Technical Review of Draft Scoping Documents for Phase II Site Inspection at AOC 20 and Data Gaps Investigation at AOC 2 NAS Fort Worth JRB, Texas April 2001

Item No.	Page	AFCEE COMMENTS	SAIC RESPONSE
10	HSP 2-1	Please consider deleting the redundant information here (already presented in the body of the Work Plan) and simply referencing the Work Plan and the AOC 20 SI HSP.	Sections 2 and 3 of the HSP were deleted The AOC 20 SI HSP was referenced.
11	HSP 3-2	Table 3-1. It is recommended that separate tables for proposed field tasks be shown for AOC 2 and AOC 20	Separate tables for proposed field tasks at AOC 20 and AOC 20 were included (Table 3-1 and Table 3-2)
12	WP 2-10	Section 2 2 3, 2nd Paragraph, Last sentence. Please revise the sentence to indicate that the aqueduct assessment has been completed.	Text of the AOC 20 SI Work Plan was revised accordingly.

TAB

WORK PLAN ADDENDUM

PHASE II SITE INSPECTION AT AOC 20 AND DATA GAPS INVESTIGATION AT AOC 2

NAS FORT WORTH JRB, TEXAS

WORK PLAN ADDENDUM

FINAL

Prepared for

U.S. Air Force Center for Environmental Excellence
Brooks Air Force Base, Texas

Prepared by

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
San Antonio, Texas

Contract No. F41624-00-D-8030
Delivery Order No. 0018

April 2001

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ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base
AFCEE	Air Force Center For Environmental Excellence
AFP 4	Air Force Plant 4
AGE	Aerospace Ground Equipment
AOC	area of concern
BRAC	Base Realignment and Closure
BTEX	Benzene, toluene, ethyl benzene and xylenes
CMS	Corrective Measures Study
DCE	dichloroethene
DERQA	Defense Environmental Restoration Account
DNAPL	Dense non-aqueous phase liquid
EI	electrical imaging
ERPIMS	Environmental Restoration Program Information Management System
FSP	Field Sampling Plan
GD	General Dynamics
GMI	Geo-Marine, Inc.
HGL	Hydrogeologic
HSP	Health and Safety Plan
IRP	Installation Restoration Program
ITIR	Informal Technical Information Report
JRB	Joint Reserve Base
MCL	maximum contaminant level
MEK	methyl ethyl ketone
MW	monitoring well
NAS	Naval Air Station
NFA	no further action
NPL	National Priorities List
PAH	polycyclic aromatic hydrocarbons
PCE	Tetrachloroethylene
PID	Photoionization detector
POTW	Publicly owned treatment works
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control

ACRONYMS AND ABBREVIATIONS (cont.)

RFA	RCRA Facility Assessment
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SAIC	Science Applications International Corporation
SB	Soil boring
SI	Site Inspection
SVOC	semi-volatile organic compound
SWMU	Solid Waste Management Unit
TCE	trichloroethene
TNRCC	Texas Natural Resource Conservation Commission
TPH	total petroleum hydrocarbon
TWC	Texas Water Commission
USACE	U.S. Army Corps of Engineers
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VOCs	volatile organic compounds
VSI	Visual Site Inspection
WAA	Waste Accumulation Areas
WSA	Weapons Storage Area

1. INTRODUCTION

This work plan addendum describes the work that will be conducted in two areas to delineate preferential groundwater pathways (gravel channels/paleochannels) within the regional trichloroethene (TCE) plume and confirm the presence of tetrachloroethylene (PCE) in groundwater (Figure 1-1 and Figure 1-2). The AOC (Area of Concern) 20 study area extends from Air Force Plant 4 (AFP 4) in the north to the Base Realignment and Closure (BRAC) boundary in the south at Naval Air Station (NAS) Fort Worth Joint Reserve Base (JRB), and includes the AOC 20 Phase II Site Inspection (SI) North Plot, the AOC 20 Phase I SI Area, and the AOC 20 Phase II SI South Plot. The second study area is the north lobe of the TCE plume at AOC 2 at the NAS Fort Worth JRB.

1.1 PURPOSE

The Phase II SI at AOC 20 will include a geophysical survey to delineate the gravel channels (paleochannels) in the Walnut/Goodland bedrock confining layer. The SI will determine preferential pathways for groundwater and associated TCE plume between AFP 4 and NAS Fort Worth JRB. The data gaps investigation at AOC 2 will include a geophysical survey to delineate the gravel channels (paleochannels) in the Walnut/Goodland bedrock confining layer and determine preferential pathways for groundwater and the associated TCE plume. Additional data will be generated in an attempt to explain high groundwater concentrations of tetrachloroethylene (PCE) in an area far way from known PCE sources at AFP4. Some of the data gaps identified in United States Environmental Protection Agency (USEPA) Region 6 comments from the Resource Conservation and Recovery Act (RCRA) Facility Investigation conducted for AOC 2 in 2000 will be addressed.

The work plan is being submitted as an addendum to the *AOC 20 Site Inspection Work Plan (Final),* November 2000. The project Field Sampling Plan Addendum and Health and Safety Plan Addendum are included as attachments to this work plan. Phase II SI and data gaps investigation activities will include:

- Performance of a seismic survey.
- Performance of an electrical imaging (EI) survey at AOC 20.
- Determination of the Walnut/Goodland aquitard topography.
- Identification of the basal gravel portions of the terrace alluvial deposits overlying the bedrock.
- Production of an updated conceptual site model.

1.2 AOC 2 DESCRIPTION AND REGULATORY HISTORY

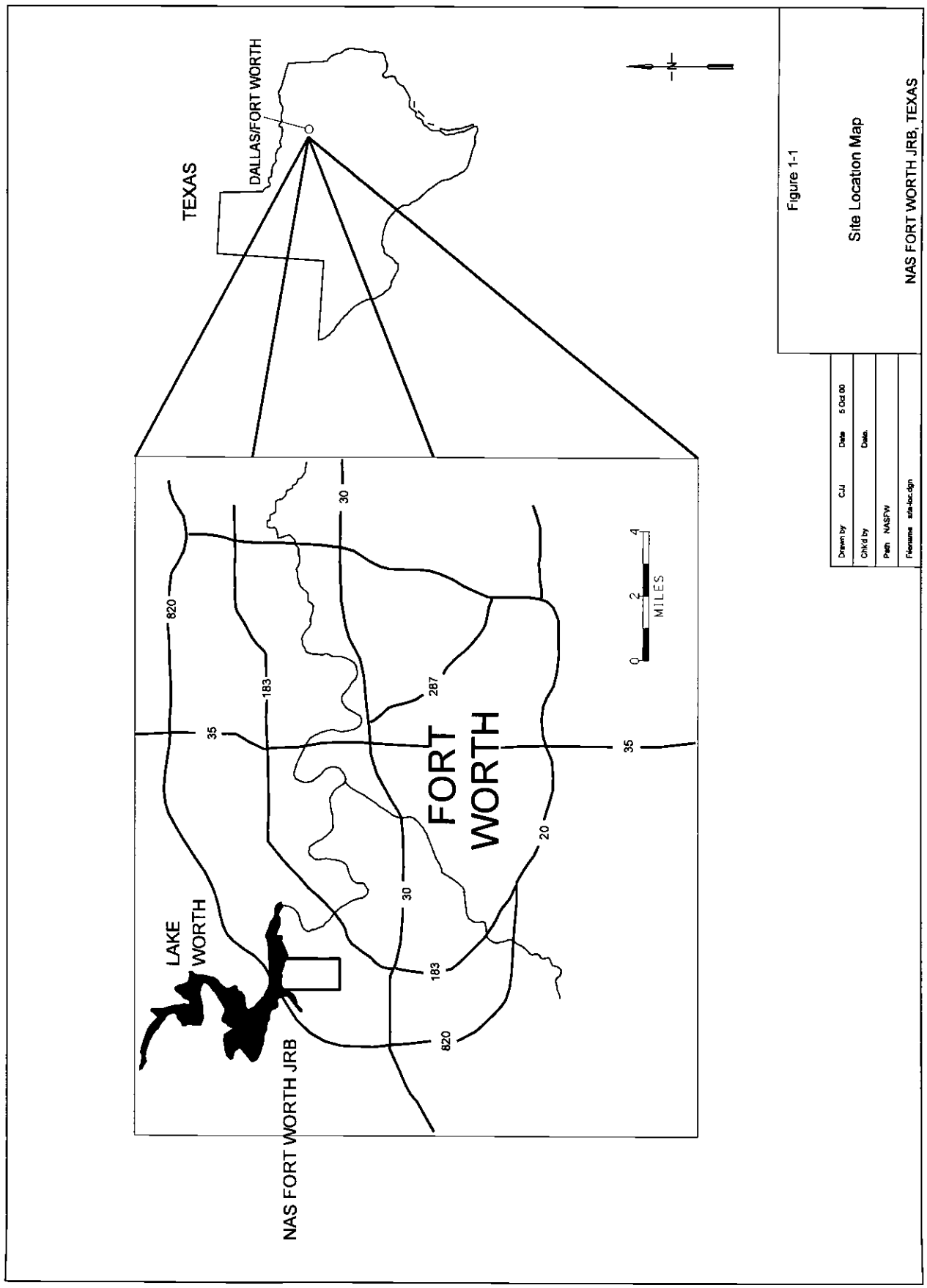
AOC 2 is defined as all areas on NAS Fort Worth JRB where TCE is detected in groundwater (Figure 1-3). This plume is not limited to TCE and may include other contaminants, in particular those related to activities involving fuel products (specifically benzene, toluene, ethylbenzene, and xylene [BTEX compounds]).

The Installation Restoration Program (IRP) was initiated in 1984 at NAS Fort Worth JRB (while it was still Carswell Air Force Base [AFB]) with a Phase 1 records search to identify past waste disposal activities that may have resulted in groundwater contamination and/or off-site migration of contaminants. Seventeen sites on the base and five sites at the off-site weapons storage area (WSA) were identified as requiring further evaluation. All 22 sites were ranked based on their environmental setting, past waste disposal practices, and contaminant migration potential. Ten of these sites subsequently were determined not to present a significant concern for adverse human health or environmental effects.

The remaining 12 sites were selected for Phase II Confirmation/Quantification investigations (Radian, 1986 and 1989). In 1989, the USEPA conducted the Preliminary Review/Visual Site inspection (PR/VSI) portions of a RCRA Facility Assessment (RFA) for the then Carswell AFB. A hazardous waste permit (HW-50289) was issued to the base by the Texas Natural Resource and Conservation Commission (TNRCC) on February 7, 1991.

Sixty-eight Solid Waste Management Units (SWMUs) and 20 AOCs are currently identified at NAS Fort Worth JRB (Table 1-1). Their locations are shown on Figure 1-3. Sites that are currently considered off base (because of base closure activities) are being managed by Air Force Center of Environmental Excellence (AFCEE) under Base Realignment and Closure (BRAC). The portions of the base currently used (or planned to be used) by NAS are being managed by AFCEE under the Defense Environmental Restoration Account (DERA).

Since 1990, site-specific investigations have been conducted at various SWMUs and AOCs (including landfills, fire training areas, oil/water separators, and waste accumulation areas) to support remediation and/or closure of sites. Some were determined by TNRCC to require no further action (NFA) and are currently considered closed: others are considered by AFCEE to qualify for NFA pending the results of ongoing studies.


TEXAS
DALLAS/FORT WORTH
N
FORT WORTH
LAKE WORTH
NAS FORT WORTH JRB
820
183
30
35
287
20
0
2
4
MILES
Figure 1-1
Site Location Map
NAS FORT WORTH JRB, TEXAS
Drawn by CJJ
Date 5 Oct 00
Chk'd by
Date
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Filename site-loc.dgn

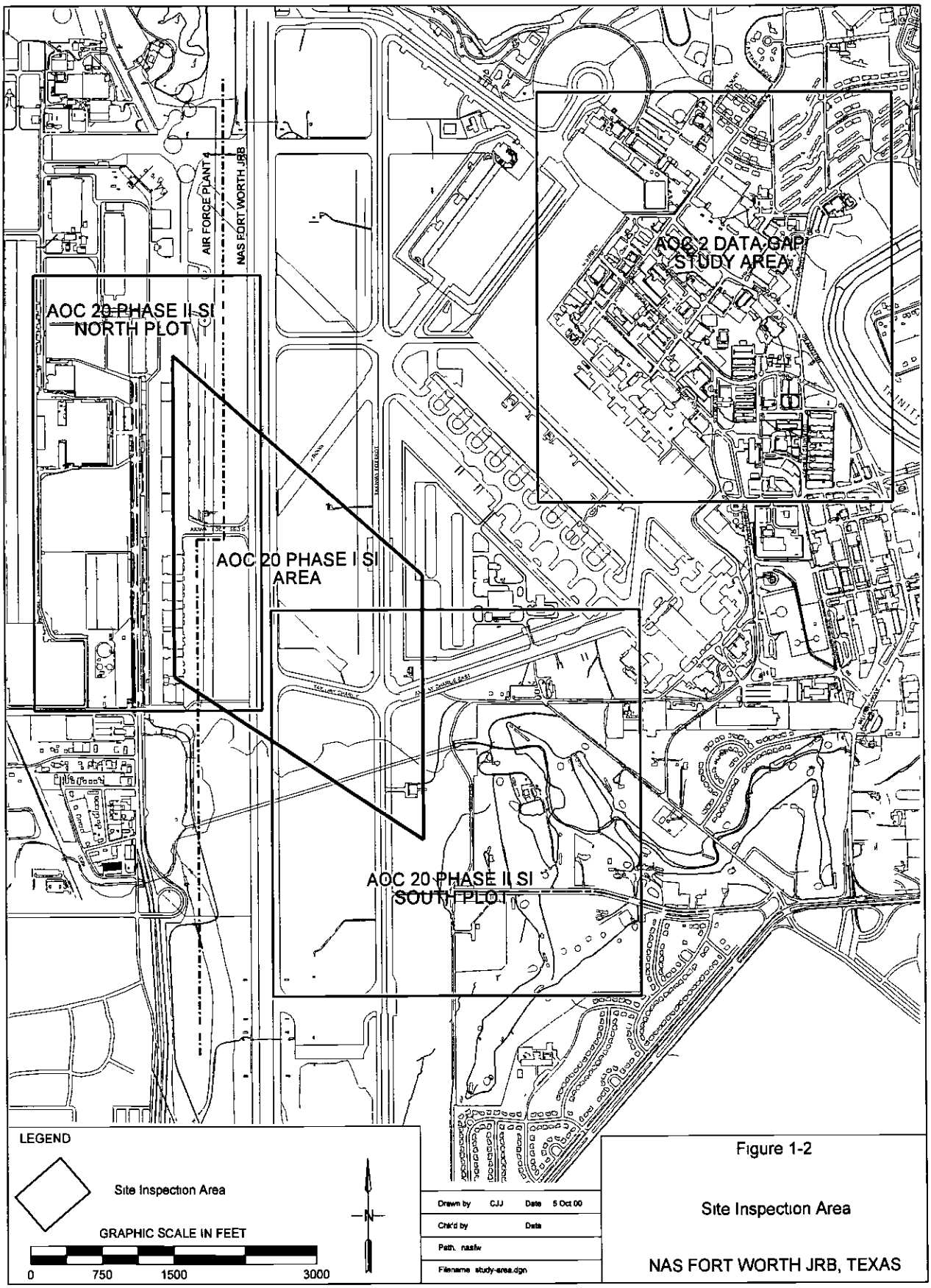
AIR FORCE PLANT 4
NAS FORT WORTH JRB
AOC 2 DATA GAP STUDY AREA
AOC 20 PHASE II SI NORTH PLOT
AOC 20 PHASE I SI AREA
AOC 20 PHASE II SI SOUTH PLOT
LEGEND
Site Inspection Area
GRAPHIC SCALE IN FEET
0
750
1500
3000
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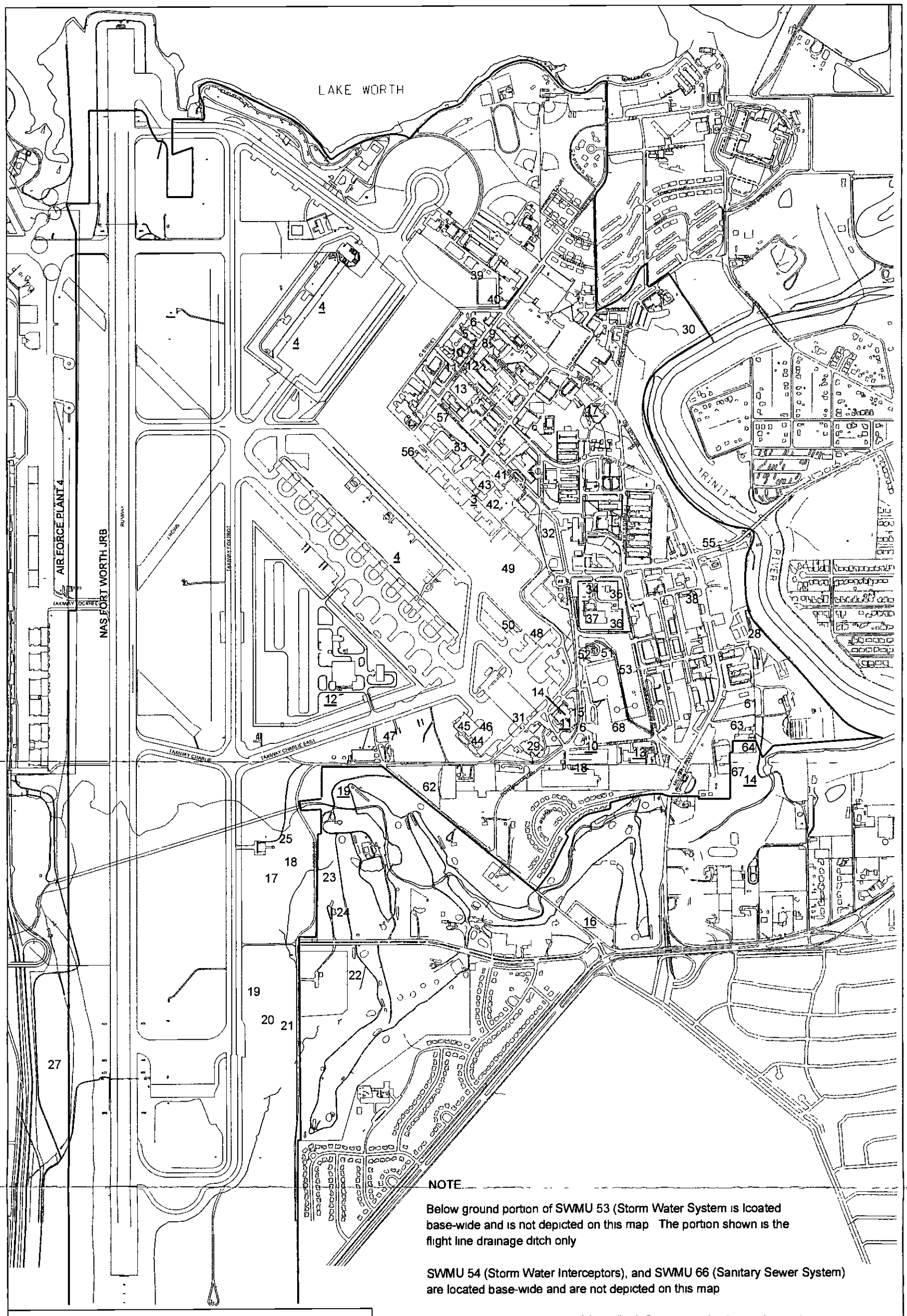
Figure 1-2
Site Inspection Area
NAS FORT WORTH JRB, TEXAS

Table 1-1
SWMUs and AOCs at AOC 2 NAS Fort Worth JRB

SWMU/AOC No.	Description
1*	Pathological Waste Incinerator
2*	Pathological Waste Storage Shed
3*	Metal Cans
4*	Facility Dumpsters
5	Building 1628 Waste Accumulation Area
6	Building 1628 Wash Rack & Drain
7	Building 1628 Oil/Water Separator
8	Building 1628 Sludge Collection Tank
9*	Building 1628 Work Station Waste Accumulation Area
10*	Building 1617 Work Station Waste Accumulation Area
11	Building 1617 Waste Accumulation Area
12	Building 1619 Waste Accumulation Area
13	Building 1710 Waste Accumulation Area
14*	Building 1060 Bead Blaster Collection Tray
15*	Building 1060 Paint Booth Vault
16	Building 1060 Waste Accumulation Area
17	Landfill No. 7
18	Fire Training Area No. 1
19	Fire Training Area No 2
20	Waste Fuel Oil Tank
21	Waste Oil Tank
22	Landfill No. 3
23	Landfill No. 4
24	Waste Burial Area
25	Landfill No. 8
26	Landfill No 3
27	Landfill No 10
28	Landfill No. 1
29	Landfill No. 2
30	Landfill No 9
61	Building 1320 Waste Accumulation Area
62	Landfill No. 6

Note:

* Sites for which no further action is required by TRNCC



NOTE

Below ground portion of SWMU 53 (Storm Water System is lcoated base-wide and is not depicted on this map The portion shown is the flight line drainage ditch only

SWMU 54 (Storm Water Interceptors), and SWMU 66 (Sanitary Sewer System) are located base-wide and are not depicted on this map

AOC 2 (Air-field Groundwater) broadly defines groundwater contamination beneath NAS Fort Worth JRB, and therefore is not depcited on this map

Figure 1-3

Drawn by	CJJ
Date	26 Apr 01
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Date	4/27/01
Path	nasfwjphase-ii
Filename	al-swmu-aoc-loc.dgn

SWMU/AOC Location Map
Data Gaps Investigation at AOC 2

NAS FORT WORTH JRB, TEXAS

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Table 1-1 (cont.)
SWMUs and AOCs at AOC 2 NAS Fort Worth JRB

SWMU/AOC No.	Description
63*	Etomology Dry Well
64	French Underdrain System
65*	Weapons Storage Area Disposal Site
66	Sanitary Sewer System
67	Building 1340 Oil/Water Separator
68	POL Tank Farm
AOC 1	Base Service/Gas Stations
AOC 2	Air Field GW Plume
AOC 3	Waste Oil Dump
AOC 4	Fuel Hydrant System
AOC 6	RV Storage Area
AOC 7	Base Refueling Area
AOC 10	Building 1064 Oil/Water Separator
AOC 11	Building 1060 Oil/Water Separator
AOC 12	Building 4210 Oil/Water Separator
AOC 13	Building 1145 Oil/Water Separator
AOC 15	Building 1190 Storage Shed
AOC 16	Family Camp
AOC 17	Suspected Former Landfill
AOC 18	Suspected Fire Training Area A
AOC 19	Suspected Fire Training Area B

Note.
* Sites for which no further action is required by TRNCC

1.3 PREVIOUS TCE PLUME-RELATED INVESTIGATIONS

The following discussions describe the history of investigations related to the TCE plume at AFP4 (upgradient of NAS Fort Worth JRB), and within the AOC 2 study area at NAS Fort Worth JRB.

1.3.1 Air Force Plant 4 Investigations

According to the Record of Decision (ROD) for AFP4 (U.S. Department of the Air Force, 1996), suspected contamination at AFP4 was first noted in 1982 by a private citizen. Within months, several investigations were started. The USAF investigation of groundwater contamination beneath AFP4 began in 1984. A Remedial Investigation/Feasibility Study (RI/FS) for AFP4 was initiated in 1990 and the completed RI/FS was approved in 1995. The proposed plan for remedial action was issued in 1995 and the ROD was signed in 1996. Several interim remedial actions were implemented to mitigate the effects of contamination at the site before the final remedies were approved. These actions included removal of contaminated soil and installation of extraction wells, french drains, a pilot-scale soil-vapor extraction system, and a groundwater extraction and treatment system. A Remedial Design Investigation was completed recently. Details of previous investigations are described in the following subsections.

1.3.1.1 Investigation History

The IRP was initiated at AFP4 in March 1984 by the USAF. As a result of the Phase I investigation, 21 sites were identified as sources of contamination due to past waste disposal practices at the facility. Shallow groundwater contaminated with TCE beneath the East Parking Lot at AFP4 (just west of the AFP4/NAS Fort Worth JRB boundary) was one of the 21 sites identified for remediation under the IRP. This area is located west of the "southern lobe" of NAS Fort Worth JRB TCE extent.

Studies conducted in 1985 found the Walnut Formation (a confining unit between the Shallow Terrace Alluvial Aquifer and the deeper Paluxy Aquifer) to be extremely thin in areas on the east side of the facility. In addition, high concentrations of chlorinated hydrocarbons and unusually high water levels were observed in the East Parking Lot monitor well. The report concluded that a "window" existing under the East Parking Lot might be serving as a flow path for contaminated groundwater from the Terrace Alluvial Aquifer to recharge the uppermost water-bearing unit of the Paluxy Formation.

In 1985, the USAF retained the US Army Corps of Engineers (USACE) to further investigate the "window" area by studying geophysical logs and proposing a monitoring program for the Paluxy. They also retained Radian Corporation to begin the IRP Stage I and II Investigations to define the presence, magnitude, extent, direction, and rate of movement of any identified contaminants at AFP4, including the East Parking Lot groundwater plume.

Based on USACE's recommendations, a "window area" investigation as conducted between November 1986 and April 1987. Three monitor wells were installed and monitored: one in the Terrace Alluvial Aquifer, one in the Upper Paluxy Formation, and one in the Upper Paluxy Sand (the first water-bearing unit of the Paluxy). As a result of the IRP Phase II investigation, which was completed in 1987, the extent and degree of the contamination at the sites were identified. The presence of TCE, dichloroethene (DCE), and chromium in groundwater beneath the AFP4 East Parking Lot, and distribution of these contaminants from the site onto NAS Fort Worth JRB, was confirmed.

In July 1989, a report was prepared that summarized the conclusions and recommendations of investigations conducted at AFP4 between January 1987 and April 1989. The contaminants detected most often on the east side of AFP4 (chromium, TCE, and trans-1,2-DCE) were believed to have originated from various sources on AFP4. The distribution of these contaminants was believed to be influenced by groundwater flow in the basal gravel of the Terrace Alluvial Aquifer (the preliminary migration pathway) and an erosional channel (the "window area") in the Walnut Formation, where over a limited area contaminated groundwater could flow to the underlying Paluxy Formation. TCE detected in groundwater from wells located on NAS Fort Worth JRB (southern and central lobes) was attributed in part to AFP4 and in part to unidentified sources on NAS Fort Worth JRB. Further hydrogeologic characterization of the Paluxy, in addition to aquifer testing of the Terrace Alluvial Aquifer and the Upper and Middle Paluxy Formations, was recommended. RI/FS activities were resumed at AFP4 in December 1990. Sampling indicated that TCE dense non-aqueous phase liquid (DNAPL) might be migrating along a paleochannel beneath the AFP4 East Parking Lot area and that TCE DNAPL might also be present elsewhere under AFP4.

In March 1991, AFCEE established a groundwater-monitoring program at AFP4 to aid in the implementation of the final Remedial Action Plan (RAP) under the IRP. Sampling objectives were:

- to monitor changes in water quality in the Terrace Alluvial and Paluxy Aquifers
- to monitor changes in surface waters adjacent to AFP4
- to monitor contaminant plumes and the effect of interim remedial actions on plume concentrations

This sampling has been conducted quarterly since April 1992.

In August 1992, the USAF contracted USACE for several tasks, including the installation of a recovery and treatment system for TCE-contaminated groundwater in the "window" area and delineation of the TCE plume on NAS Fort Worth JRB. In 1993, USACE retained IT Corporation for the design and operation of the groundwater treatment system and Geo-Marine, Inc (GMI) for the TCE plume delineation. The TCE extent boundary shown on Figure 1-3 was interpreted in part from GMI's data. General Dynamics (GD) provided support for these projects. The groundwater treatment system and others at

AFP4 were installed in 1992 and 1993. Some have operated continuously, while others have operated only intermittently.

An investigation to support a remedial design for the East Parking Lot has been completed recently. Investigation activities included monitoring well installation, aquifer testing, groundwater and soil sampling, and tracer studies to identify DNAPL in the East Parking Lot area. Results of this investigation were not available.

1.3.1.2 AFP4 Regulatory History and Record of Decision

In August 1990, after USEPA placed AFP4 on the National Priorities List (NPL), the USAF, USEPA, and the Texas Water Commission (TWC, now the TNRCC) signed a Federal Facility Agreement under which the facility would conduct RI/FS activities by specific dates. In July of 1996, the Final ROD for AFP4 (U.S. Department of the Air Force, 1996) was issued. The ROD addressed the final response actions required for remediation of soil, sediment, and groundwater in all areas of the site. Major components of the selected groundwater remedy for the Paluxy Aquifer and Upper Sand Groundwater include:

- Extracting contaminated groundwater from the Paluxy Aquifer and the Upper Paluxy Sand in the East Parking Lot area, if contaminant concentrations exceed maximum contaminant levels (MCLs).

- Treating the extracted groundwater with ultraviolet oxidation or similar technology with off-gas treatment that results in near-zero atmospheric emissions and discharging the treated water to surface water or to a publicly owned treatment works (POTW).

- Monitoring the movement of contamination in the Paluxy Aquifer and the Upper Paluxy Sand, and installing additional monitor wells, as needed.

Major components of the selected remedy for the East Parking Lot groundwater plume (in the Terrace Alluvial Aquifer) include:

- Removal of the DNAPL by enhanced dissolution, followed by groundwater extraction.

- Treatment of extracted groundwater with air stripping, followed by discharge of the treated water to surface water or POTW. Potential use of a physical or hydraulic barrier to separate the "window" area of the Terrace Alluvial Aquifer from areas upgradient of the "window."

- Installation of soil-gas probes to monitor selected remedy performance.

A key component of the ROD related to the Paluxy Aquifer, Upper Paluxy Sand, and the East Parking Lot plume includes prevention of migration of contaminated groundwater (above MCLs) off property controlled by AFP4 or NAS Fort Worth JRB. Another key component is prevention of excess risk in surface water. Contaminant level for these goals

is dependent on the groundwater discharge points (Farmers Branch Creek or the West Fork Trinity River). As stated in the previous section, investigations to support preparation of a remedial design for the East Parking Lot plume have been completed recently.

1.3.2 NAS Fort Worth JRB Investigations

Multiple investigations have been conducted at NAS Fort Worth JRB since the base-related SWMUs and AOCs were first identified in 1984. The following paragraphs summarize specific SWMU/AOC and other investigations that address sites or sampling locations within the area of the northern lobe of the AOC 2 TCE plume. Included are descriptions of investigations related to the Basewide Groundwater Sampling & Analysis Program, the Fuel Hydrant System (AOC4), the Sanitary Sewer System (SWMU 66), Building 1628, Landfill No.9 (SWMU 30), Waste Accumulation Areas, and underground storage tanks.

1.3.2.1 Basewide Groundwater Sampling and Analysis Program

Basewide groundwater sampling has been conducted at NAS Fort Worth JRB wells since April 1995: quarterly through April 1996, and again quarterly since January 1997. The current Basewide Quarterly Groundwater Sampling and Analysis Program was initiated in January 1997; the most recent quarterly sampling was conducted in October 2000. Quarterly groundwater monitoring has also been conducted at AFB4, which includes wells on the western portion of NAS Fort Worth JRB.

The purpose of the NAS Fort Worth JRB Basewide Quarterly Groundwater Sampling and Analysis Program is primarily to monitor downgradient groundwater plume extent and migration patterns while the various site investigations are going on.

1.3.2.2 Fuel Hydrant System (Area of Concern 4)

The Fuel Hydrant System, located along the western edge of the Alert Apron (Figure 1-3), distributed fuel from the tank farms to the flight apron fueling areas since the opening of the base in the 1940s. This system was removed from operation and dismantled during various investigation phases in the early 1990s. After removal of the pump stations and associated components, direct push studies were conducted to delineate fuel-related soil contamination potentially associated with releases from the system.

AFCEE has contracted Hydrogeologic (HGL) to conduct a groundwater and soil investigation of BTEX-related contamination resulting from operation of the Fuel Hydrant System (known as AOC4, which includes the fueling location known as Spot-35). The field effort was completed in September 1998. This effort consisted of sampling 17 new and existing groundwater monitoring wells for volatile organic compounds (VOCs), petroleum aromatic hydrocarbons (PAHs), and total petroleum hydrocarbons (TPHs). Ten soil borings were completed and soil samples collected and analyzed for VOCs, PAHs, and TPH. The report describing the findings was not available.

1.3.2.3 Building 1628 Investigation (SWMUs 5, 6, 7, 8)

Building 1628 was formerly the Aerospace Ground Equipment (AGE) Maintenance Shop, and operations there included corrosion control activities. This Building, which includes several SWMUs, is discussed individually here due to the presence of several contamination source issues. Waste generated from the activities in the building included antifreeze and paint strippers and thinners. A Waste Accumulation Area (SWMU 5) and Wash Rack and Drain (SWMU 6) were identified during the initial records search in 1984 as being located inside Building 1628. Both of these units were reported as removed in the early 1990s. An oil/water separator (SWMU 7) and a sludge collection tank (SWMU 8) located outside Building 1628, which received waste from the AGE Maintenance Shop, are still in place. There are also several underground storage tanks (USTs) in the area, associated with a fueling system adjacent to Building 1628, and free product has historically been identified in the groundwater.

1.3.2.4 Sanitary Sewer RCRA Facility Investigation (SWMU 66 and SWMUs 7, 40, and 41)

IT Corporation was contracted by AFCEE to perform a RFI of the Sanitary Sewer System at NAS Fort Worth JRB. The investigation was completed and the RFI report submitted in September 1997. This investigation was to determine the nature and extent of any contamination resulting from releases into the environment from the basewide Sanitary Sewer System and connecting oil/water separators (OWS). Several of these OWSs are located within the north lobe area of the AOC 2 TCE plume (SWMUs 7, 40, and 41).

According to the RFI Report, low concentrations of both organic and inorganic constituents were detected in soil samples collected as part of the RFI across the base. There was, however, no specific pattern of contaminants or concentrations that would indicate a point source release from the Sanitary Sewer System. Groundwater sample results also showed no significant contamination in groundwater directly attributed to the Sanitary Sewer System. Detection of TCE across the base during Sanitary Sewer System RFI sampling was attributed to AOC 2, and was not considered a result of any point releases from the Sanitary Sewer System. Human health and ecological risk assessments concluded that the Sanitary Sewer System is not a source of unacceptable human health risk and projected no unacceptable overall ecological risk indicator to wildlife receptor species.

OWSs at Building 1628 (SWMU 7), Building 1643 (SWMU 40), and Building 1414 (SWMU 41), which are those OWSs located within the northern lobe area of the AOC 2 plume, were included in the Sanitary Sewer System RFI sampling effort. The Building 1643 OWS (SWMU 40) is located along the eastern edge of the AOC 2 plume; no TCE or PCE was detected in near-surface or subsurface soil samples. The Building 1628 OWS (SWMU 7) is located within the AOC 2 plume extent, south of the Alert Apron. Of all the near-surface and subsurface soil samples collected there, only one detection of TCE was reported at a low (estimated below quantition limits) value. The Building 1414 OWS (SWMU 41) is also located within the northern lobe of AOC 2 TCE

plume extent; no detections of organic compounds were reported in either near-surface or subsurface soil samples collected there.

1.3.2.5 Waste Accumulation Areas (SWMUs 5, 11, 12, 13, 32, 33, 39, 42)

Several Waste Accumulation Areas (WAAs) are located within the area of the north lobe of the AOC 2 TCE plume (see Figure 1-3 for SWMU locations). Several of these sites are being addressed under a specific sampling effort being conducted to confirm the lack of significant releases from these WAAs, and to provide supporting documentation for closure. For this effort, HGL was contracted by AFCEE to conduct confirmation soil and groundwater sampling for analyses of 40 CFR Part 264 Appendix IX VOCs, semi-volatile organic compounds (SVOCs), and metals.

These sites include the WAA at Building 1628 (SWMU 5), which was used to stage the AGE Maintenance Shop wastes (waste paint and thinners, methyl ethyl ketone (MEK), antifreeze, and batteries).

The SWMU 11 WAA was located in Building 1617 where printed circuit boards were produced; the process generated etching and lacquer thinner/ink residue. The nearby SWMU 12 WAA was located in Building 1619, a jet engine repair shop, which generated PD-680, jet fuel, and engine oil. Neither of these WAAs currently exists, but contaminant releases to the soil were suspected at the SWMU 12 WAA. Both of these sites are currently included in HGL's proposed WAA sampling effort.

The SWMU 13 WAA was located in Building 171, a former photographic film-developing location; spent photograph fixer would have been staged at this location. This WAA does not currently exist, and no releases were suspected based on historical records or visual observations.

The SWMU32 WAA was located at Building 1410, another jet engine repair shop, which generated PD-680, JP-4, engine oil, solvents, and degreasers. The SWMU 33 WAA was located in Building 1420, a maintenance and inspection location for munitions trailers; wastes generated included PD-680 Type II, hydraulic fluid, and brake fluid.

1.3.2.6 Landfill No.9 (SWMU 30)

Landfill No. 9 is located in the northeast portion of the base along the eastern boundary of the AOC 2 study area boundary, and adjacent to the West Fork Trinity River. Although not situated within the TCE plume and not therefore a potential source area, this landfill is described here because it may be present within a future downgradient migration pathway of the TCE plume. Clean construction rubble and trees were reported to have been dispose at this unit. No hazardous materials are reported to be buried at this site, although materials with hazardous constituents may have been disposed there. HGL was contracted by AFCEE to conduct a soil and groundwater investigation of the site in order to close the landfill.

1.3.2.7 Underground Storage Tank Sites

Fuel storage and transmission at various locations on the NAS Fort Worth JRB facility have occurred since operations began in the 1940s. Miscellaneous underground storage tanks (UST) located throughout the base have been in use over time. HGL has been contracted by AFCEE to conduct investigations of several of these UST sites on base, including four sites within the AOC 2 study area. These sites are located at Buildings 1411 (UST Nos. 1411-1, 1411-2, and 1411-3), 1427 (UST No.1427-1 and 1750-2), and 4136 (4136-1). The work has been proposed but not initiated. Proposed activities at these sites include completion of multiple soil borings at each site for analysis of VOCs (8260B/5035), TPH (418.1), and polycyclic aromatic hydrocarbons (PAHs) (8310).

In 1993, following confirmation releases from the USTs adjacent to Building 1628, the Building 1628 tanks (which contained gasoline, diesel, and JP-4) were removed and the contaminated soil was backfilled into the excavated area. In 1994, USACE performed an investigation to determine the extent of groundwater contamination attributable to these Building 1628 USTs, collecting samples and installing and sampling three monitor wells (USACE, 1994). Results indicated that soil contamination by BTEX compounds was limited to the approximate extent of the former tankhold. Groundwater contamination identified in monitor wells (BTEX compounds as well as TCE and its degradation products) was documented downgradient, and in subsequent groundwater sampling events, two of the wells were found to contain floating free product (fuel-related). Additional soil borings and monitor well installations were performed in this area in December 1996.

1.4 AOC 2 RFI

The RFI for AOC 2 was conducted by CH2M Hill between 1996 and 1998, and the draft report was submitted to AFCEE in November 2000. The general objective of an RFI was to obtain data that support the development and evaluation of alternatives for a Corrective Measures Study (CMS). This included characterization of the environmental setting, definition and characterization of source(s), delineation of contamination extent in all media, and identification of potential receptors.

More specifically, the primary objectives for the AOC 2 RFI were:

1. Delineation of the potential sources of TCE and related contaminants that are contributing to the northern lobe of groundwater contamination occurring in AOC 2.

2. Physical identification of primary flow paths within the Terrace Alluvial, and potentially to the Paluxy Aquifer in the northern lobe of AOC 2.

3. Delineation of the nature and extent of the northern lobe of groundwater contamination by TCE and related contaminants in the AOC 2 study area.

4. A fate and transport assessment, in conjunction with the known nature and extent of contamination, will help determine the on-site and/or off-site sources responsible for the present contaminant distribution within AOC 2. It will also show the extent to which natural attenuation is occurring within the AOC 2 contaminant plume.

5. A risk characterization to evaluate the risk posed to human health and the environment by the constituents encountered in soils and groundwater that define AOC 2.

Activities conducted included a seismic reflection survey, a direct push investigation, a drilling and monitor well installation program, soil and groundwater sampling and analysis, evaluation of hydrogeologic and stratigraphic conditions dictating migration pathways, a baseline risk assessment, and an evaluation of fate and transport characteristics of the plume, including a preliminary screening of the occurrence of natural attenuation.

Major findings included:

- The West Fork Trinity River has not yet been impacted by TCE contamination associated with the AOC 2 northern lobe.
- The extent of the AOC 2 plume is slightly wider and longer than that previously documented.
- There was no evidence to support sources of TCE within the AOC 2 study area other than the AFP4 plume migrating from the flightline area.
- The Terrace Alluvial Aquifer groundwater flows east/northeast from AFP4 across the study area, with preferred flow along basal gravel and weathered bedrock at the bottom of the aquifer.
- Preliminary screening of the occurrence of natural attenuation showed that although some natural attenuation seems to be occurring, biologically-mediated natural attenuation mechanisms should probably not be considered significant fate processes for the chlorinated solvents demonstrated in AOC 2 groundwater.
- The risk assessment showed no adverse cancer or non-cancer health effects are predicted to result from exposure of a construction worker to AOC 2 study area soils. The estimated lifetime cancer risk inhalation of volatiles in groundwater for a potential commercial/industrial exposure is $1x10^{-8}$, which is below the cancer risk criterion of 10^{-6}. Therefore, adverse non-cancer health effects are not predicted to occur from exposure of a construction worker to volatile emissions from groundwater at AOC 2.
- A maximum TCE concentration of .27 µg/L in the West Fork Trinity River would be protective of human health and the environment. Should the West Fork Trinity River be impacted by AOC 2 groundwater in the future, it is possible that river flow would not be sufficient all of the time to keep concentrations always below this level.

2. PROJECT TASKS

The purpose of the Phase II SI at AOC 20 is to further delineate the paleochannel in the study area. The primary objectives are as follows:

- Mapping the subsurface topography of the paleochannel (the surface of the Goodland/Walnut Aquitard).
- Mapping the distribution of the gravelly deposits in the paleochannel.
- Mapping the groundwater plume pathway.
- Refining the conceptual model.

The objective of the Data Gaps Investigation at AOC 2 are as follows:

- Mapping the subsurface topography of the paleochannel (the surface of the Goodland/Walnut Aquitard).
- Mapping the distribution of the gravelly deposits in the paleochannel.
- Mapping the groundwater plume pathway.
- Confirming the presence and identifying potential sources of PCE in groundwater.
- Refining the conceptual model.

2.1 CURRENT SITE CONDITIONS AND WORKING HYPOTHESIS

To design the Phase II SI and Data Gaps Investigation, major issues of the site conditions were reviewed. Figure 2-1 was constructed to represent the current location of the TCE plume based on the following information:

- Results of the Phase I SI at AOC 20,
- Results of basewide quarterly groundwater sampling during October 2000,
- Results of the cone penetrometer investigation at the BRAC boundary during Spring 2001, and
- Delineation of the extent of the groundwater plume exceeding drinking water standards (shown as dashed line of 5 µg/L of TCE) based on historical data.

Figure 2-2 shows the topography of the bedrock that was based on both soil borings and seismic survey mapped during the Phase I SI at AOC 20.

Based on the historical information, hydrogeology, Phase I SI results, and the current groundwater plume, the following working hypotheses were established to formulate investigation strategy:

- The TCE plume has migrated throughout NAS Fort Worth JRB through a narrow channel and has spread into a wide area with three major lobes (north, middle, and south).

- Multiple potential sources near the areas of higher concentration (Figure 2-1) have created additional TCE plumes that commingled with the southern lobe of the AFP 4 TCE plume.

- Minor sources of PCE may co-exist with TCE sources.

- The presence of organic matter in the landfills supports anaerobic degradation of the solvents in isolated areas of the groundwater.

The north lobe of the TCE plume at AOC 2 may have migrated approximately 1.5 miles, reaching the east fork of the Trinity River, and additional sources of PCE may exist in the area. The center lobe appears to have reached steady state condition, and the southern lobe has entered Farmers Branch Creek. The contaminated groundwater enters surface water as base flow or as seeps and may be seasonal due to groundwater elevation fluctuation.

2.2 INVESTIGATION STRATEGY

The SI and data gaps investigation will be conducted in the following major phases:

1. A seismic survey will be conducted and integrated with existing seismic and soil boring data to determine the aquitard elevation.

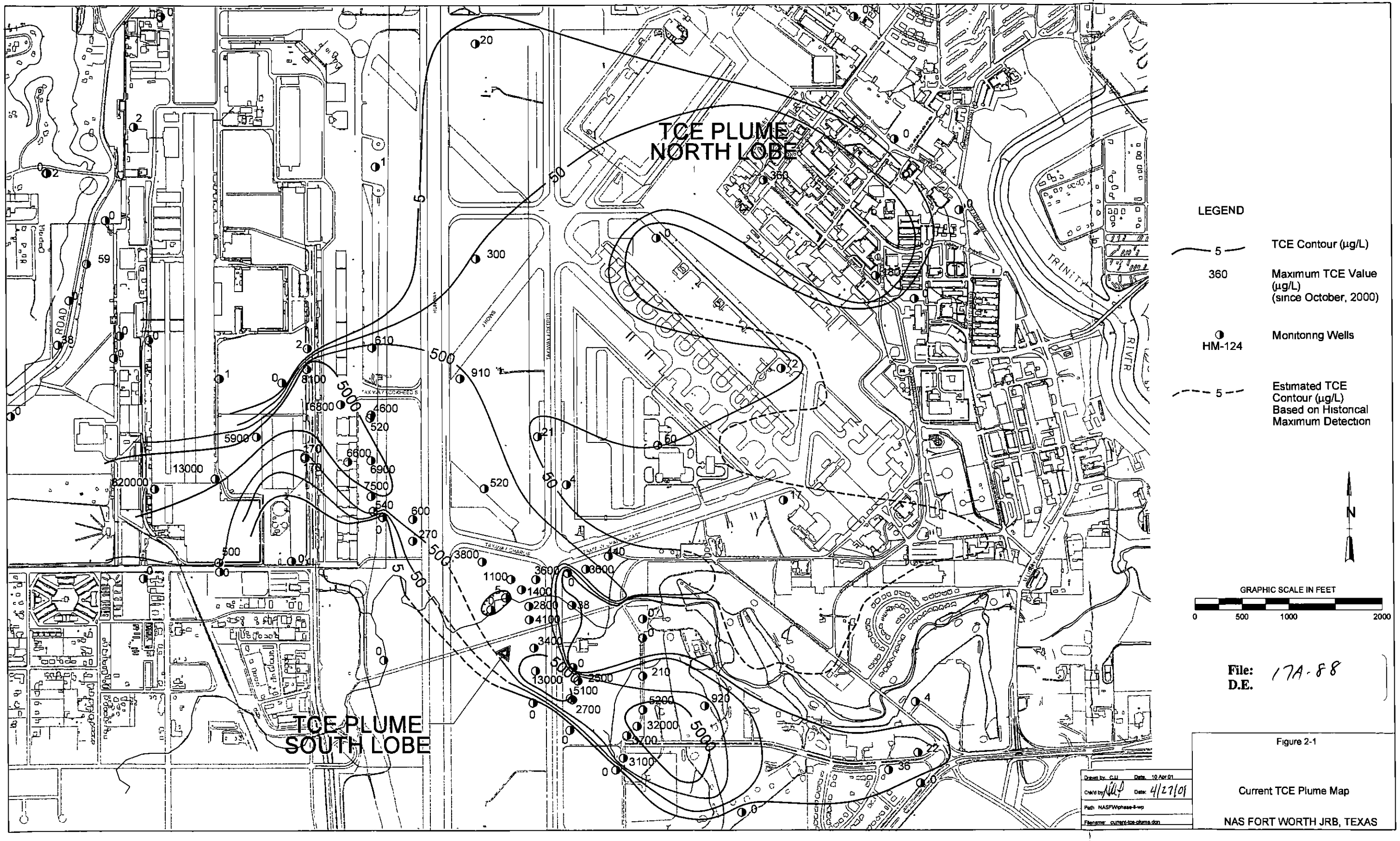
2. An EI survey will be conducted to define the basal gravel distribution pattern in AOC 20.

3. Soil borings will be installed and logged to confirm seismic and EI survey results and to fill in data gaps for channel mapping.

4. Groundwater samples will be collected from the soil borings that have been converted to monitoring wells. The samples will be analyzed to update the geometry of the TCE plume, provide natural attenuation data, confirm current groundwater chemistry, and confirm the presence of PCE at AOC 2.

5. A visual inspection will be conducted at the west bank of the West Fork Trinity River to identify and locate any groundwater seeps in the area downgradient of AOC 2. Up to ten seep locations will be marked, surveyed, and sampled. Two staff gauges will be installed in the West Fork Trinity River for surface water level measurement and sampling.

6. All data will be integrated to determine aquitard topography and paleochannel location.


TCE PLUME
NORTH LOBE
TCE PLUME
SOUTH LOBE
TRINITY
RIVER
ROAD
LEGEND
5
TCE Contour (µg/L)
360
Maximum TCE Value (µg/L) (since October, 2000)
HM-124
Monitoring Wells
5
Estimated TCE Contour (µg/L) Based on Historical Maximum Detection
N
GRAPHIC SCALE IN FEET
0
500
1000
2000
File: 17A-88
D.E.
Figure 2-1
Current TCE Plume Map
NAS FORT WORTH JRB, TEXAS
Drawn by: CJJ
Date: 10 Apr 01
Chk'd by:
Date: 4/27/01
Path: NASFWphase-II-wp
Filename: current-tce-plume.dgn

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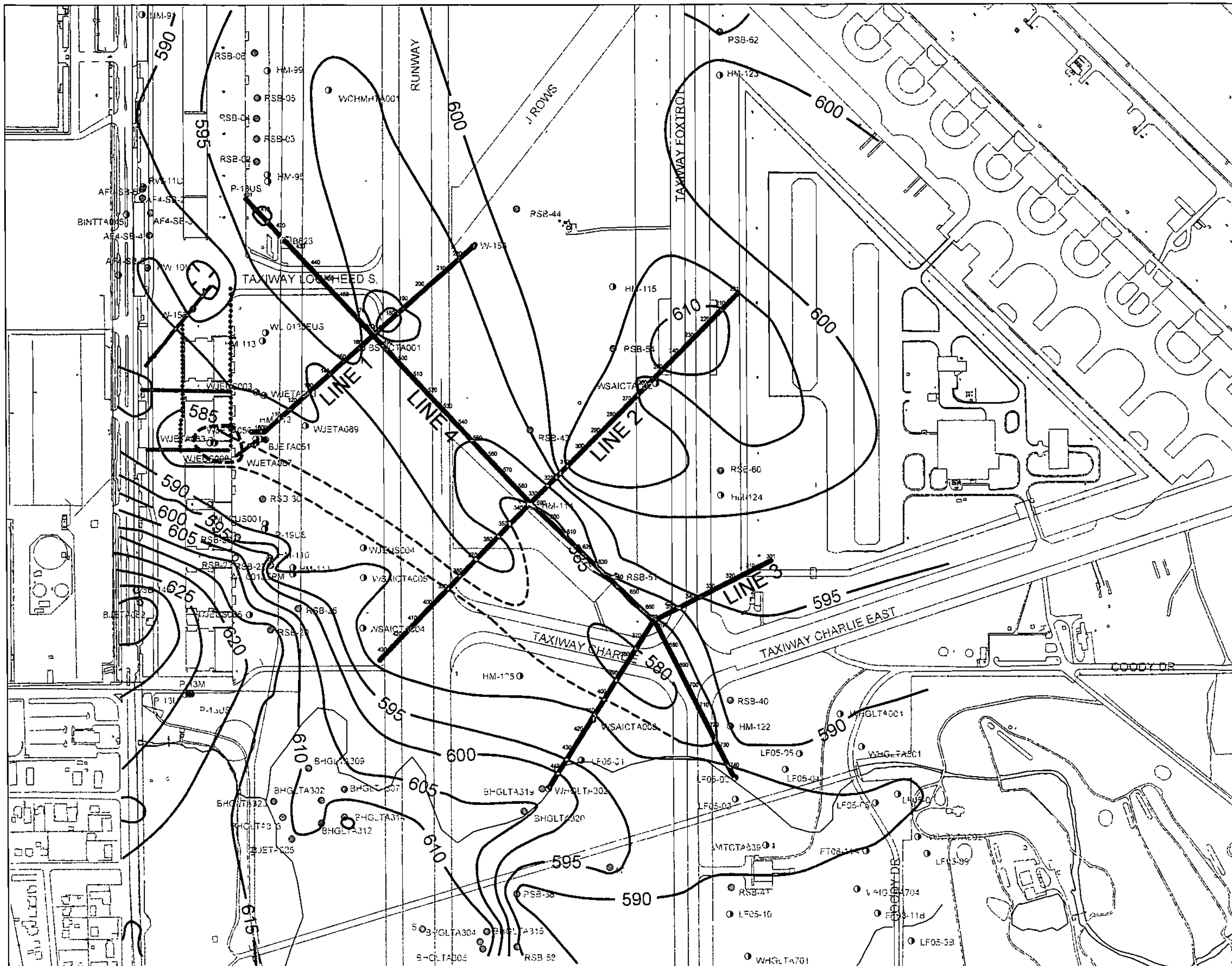

LEGEND

- Bedrock Elevation Contours
- Soil Borings
- Monitoring Wells
- Past Seismic Shot Point
- Current Seismic Shot Point
- Area Bedrock Missing

N

GRAPHIC SCALE IN FEET

0 250 500 1000

File: 17A-88
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Filename: bedrock-ele.dgn			

Figure 2-2

Bedrock Elevation Contours Based on Soil Borings and Seismic Data (Phase I SI Results)

NAS FORT WORTH JRB, TEXAS

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2.3 FIELD TASKS

Proposed field tasks for AOC 20 and AOC 2 are summarized in Table 2-1 and Table 2-2, respectively. Details of the proposed field tasks are described in the following sections. Proposed locations of EI lines and seismic survey lines, the existing monitoring wells installed in the shallow aquifer, and historical surface water monitoring points are shown in Figure 2-3. Proposed locations of geophysical lines and wells completed in the Paluxy Aquifer are shown in Figure 2-4. Actual locations of seismic lines will be determined through evaluation of preliminary seismic data.

2.3.1 Field Investigation Procedures for Phase II Site Inspection at AOC 20

2.3.1.1 Land Survey

The surveyor will survey along the seismic lines, at the endpoints, cross-over points (assuming some lines will be disrupted due to crossing runways), and EI lines. All new soil boring (SB) and monitoring well (MW) locations will be surveyed.

2.3.1.2 Seismic Survey

The seismic survey at AOC 20 will include 1,250 seismic shot points (490 at the AFP 4/NAS Fort Worth JRB boundary and 760 at the BRAC boundary) at the cross points, and two velocity point surveys through existing MWs (Figures 2-3 and 2-4). In addition, two Quality Assurance/Quality Control (QA/QC) velocity surveys will be performed at wells screened into the Paluxy aquifer. One of the Paluxy wells will contain up to 10 feet of the Goodland/Walnut aquitard (located tentatively at WJEUS008). The second location will be at a well that does not contain Goodland/Walnut aquitard materials. Each location will be surveyed with a short line (10 seismic points) to acquire data for velocity simulation.

2.3.1.3 Electric Imaging

An EI survey (Dipole-Dipole, four lines at 2,000 feet each, total of 8,000 feet) will be performed (Figures 2-3 and 2-4). Two of the lines at the AFP 4 and the NAS Fort Worth JRB boundary are connected.

2.3.1.4 Soil Boring/Monitoring Well Installation and Sampling

Three SBs will be advanced to a maximum depth of 60 feet, and five soil borings to a maximum depth of 35 feet to confirm lithology and channel location. One of the 60-foot borings and three of the 35-foot borings will be converted to MWs for additional groundwater mapping. MWs will be constructed with 2" PVC screens and risers, screened across the entire saturated thickness, and flush-mounted.

Table 2-1
Proposed Field Tasks
Phase II Site Inspection at AOC 20 and Data Gaps Investigation NAS Fort Worth JRB, Texas

Scope	AOC 20 Phase II Quantity	Specification
Visual Inspection		
River Staff Gauges		
Soil Borings (SB)	8	35 to 60 ft. deep, total of 355 ft
Monitoring Wells	4	Convert 4 of the 8 SBs to monitoring wells, 2" PVC screen & riser, 2' sump, entire saturated length, TBD screen length
Seismic Shot Points	1250	AFP 4 area 5 lines at 9,800 ft. BRAC boundary 6 lines at 15,200 ft Shot-point spacing at 20 ft. for a total of 1,250 points
Seismic Velocity Surveys	2	
Walnut/Paluxy QA/QC seismic surveys	2	20 shot points on two lines 2 velocity survey on two MWs
EI Survey	4x2000 ft. = 8000 ft.	One long line at AFP 4/NAS Fort Worth JRB boundary and 2 at BRAC boundary
Survey Coordinates	52	44 seismic (4 are on QA/QC lines), 4 EI, and 4 SB for easting, northing, and ground elevation
Survey Coordinates	4	MWs for easting, northing, and ground and TOC elevations
GW VOC and MNA samples	15	4 new MW, 11existing MW samples from 15 wells
GW Dup/QA/QC samples		
Soil VOC and TOC samples	8	"Significant PID reading" or at groundwater interface
Soil Dup/QA/QC samples	15 VOC/18 MNA	5% Duplicates; 5% QA/QC

AOC area of concern
BRAC Base Realignment and Closure
Dup duplicate
EI electrical imaging
ft. feet
GW groundwater
MNA monitored natural attenuation
MW monitoring well
PID photoionization detector
QA/QC Quality Assurance/Quality Control
TOC total organic carbon
VOC volatile organic compounds

Table 2-2
Proposed Field Tasks
Phase II Site Inspection at AOC 2 and Data Gaps Investigation
NAS Fort Worth JRB, Texas

Scope	AOC 2 Quantity	Specification
Visual Inspection	5,000 ft.	Along west bank of Trinity River, to identify seeps
River Staff Gauges	2	In the West Fork Trinity River
Soil Borings (SB)	10	Maximum 30 ft. deep
Monitoring Wells	8	Convert 6 of the 10 SBs to MWs, add one next to PCHMHTA0E3 and one next to GMI-22-05M, 4" PVC screen & riser, entire saturated length
Seismic Shot Points	1,100	Shot point spacing @ 20 ft. for a total of 22,000 ft.
Seismic Velocity Surveys	2	
Walnut/Paluxy QA/QC seismic surveys		
EI Survey		
Survey Coordinates	36	22 seismic, 2 SBs, 10 seeps, and 2 river staff gauges for easting, northing, and ground elevation
Survey Coordinates	8	MWs for easting, northing, and ground and TOC elevations
GW VOC and MNA samples	35	8 new MW, 15 existing MW, 10 seep, 2 creek water
GW Dup/QA/QC samples		
Soil VOC and TOC samples	10	"Significant PID reading" or at groundwater interface
Soil Dup/QA/QC samples	9 VOC/12 MNA	5% Duplicates, 5% QA/QC

AOC area of concern
BRAC Base Realignment and Closure
Dup duplicate
EI electrical imaging
ft. feet
GW groundwater
MNA monitored natural attenuation
MW monitoring well
PID photoionization detector
QA/QC Quality Assurance/Quality Control
TOC total organic carbon
VOC volatile organic compounds

Soil samples will be collected just above groundwater or at the sample interval with the most significant PID reading.

Samples will be collected from the four new and a maximum of 11 existing MWs for Volatile Organic Compounds (VOCs) and natural attenuation parameters. The new wells will be screened across the entire saturated zone. Four existing wells (WHGLTA052, WHGLTA303, WHGLTA801, and LF03-03E) will be sampled initially during the performance of the seismic survey. The remaining wells will be sampled during the same time frame as the new monitoring wells.

2.3.2 Field Investigation Procedures for Data Gaps Investigation at AOC 2

2.3.2.1 Land Survey

End point and cross-over points of the seismic lines, seeps, staff gauges, SBs, and MWs will be surveyed.

2.3.2.2 Seismic Survey

Seismic surveying at AOC 2 will consist of 1,100 shot points (20-foot spacing) and two velocity point shots through two existing monitoring wells at the locations indicated in Figure 2-4.

2.3.2.3 Soil Boring/Monitoring Well Installation and Sampling

Eight SBs will be installed to confirm the channel location. Six of the SBs will be completed as monitoring wells, with maximum depth of 30 ft. The monitoring wells will be constructed using 4" PVC screens and risers, screened the entire saturated thickness, flush mounted to the surface, and with a maximum 2' deep sump. In addition, a MW will be installed next to direct push point PCHMHTA0E3 to confirm the PCE detection and a MW will be installed next to GM I-22-05M.

To determine if surface water is impacted, a visual inspection of the west bank of the West Fork Trinity River will be completed. Groundwater seeps in the area downgradient of AOC 2 will be located and identified. The bank is approximately 5,000 feet long (see Seep Investigation Area, Figure 2-3). A maximum of ten seep locations will be marked, surveyed, and sampled. Two river staff gauges will be installed to mark surface water level measurement and sampling points.

Groundwater samples will be collected from the eight newly installed MWs, a maximum of 15 existing MWs, 10 seeps, and two creek locations to map the groundwater plume. The samples will be analyzed for VOCs and monitored natural attenuation parameters. Water levels will be obtained from the new and existing wells and staff gauges at the river for potentiometric surface mapping. Table 2-2 presents a summary of the proposed sample quantities, laboratory analytical methods and containers preservation, and holding time requirements.

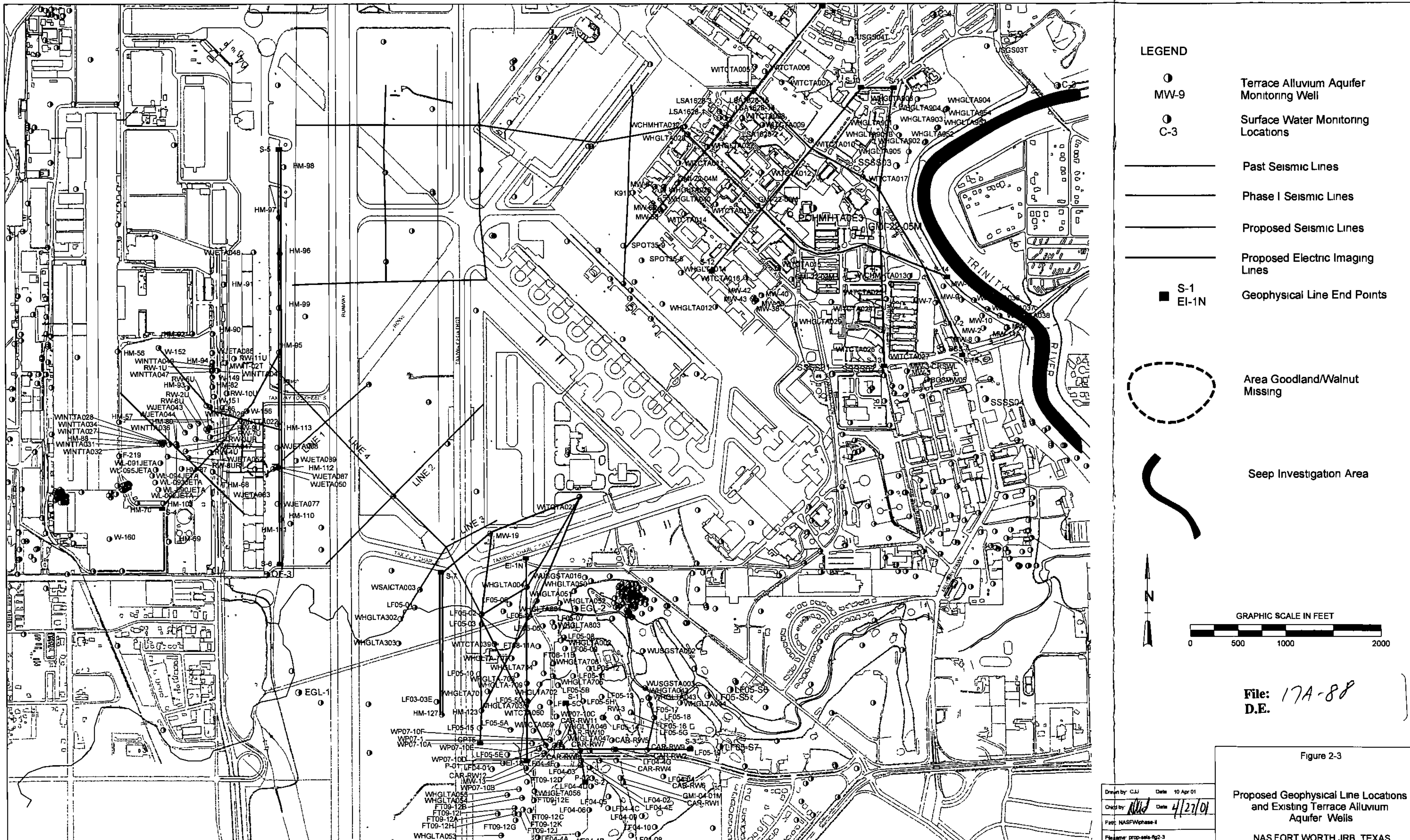

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Figure 2-3

Proposed Geophysical Line Locations and Existing Terrace Alluvium Aquifer Wells

NAS FORT WORTH JRB, TEXAS

Drawn by: CJJ Date: 10 Apr 01
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Path: NASFWphase-II
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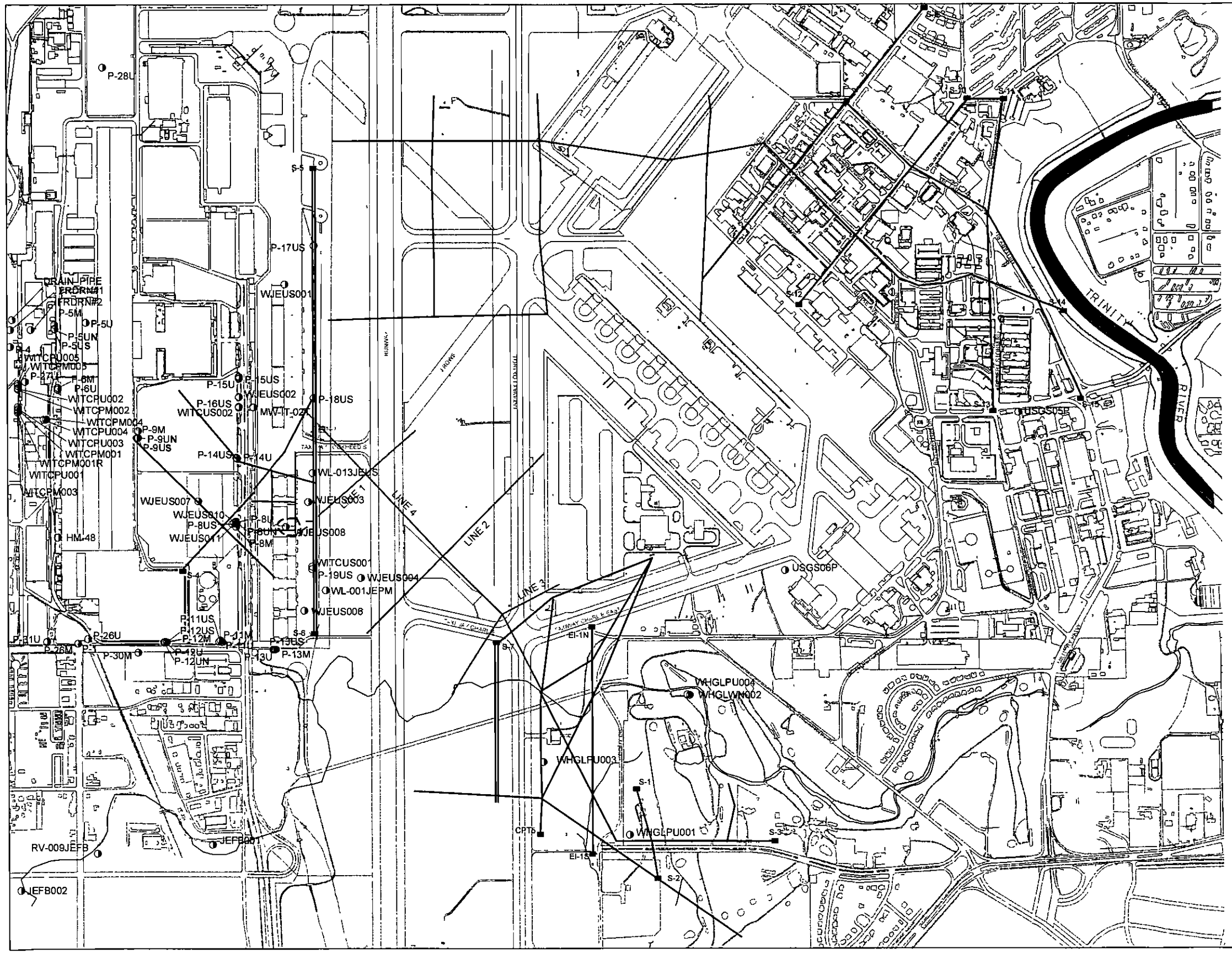

LEGEND

P-11U — Paluxy Aquifer Monitoring Well

Past Seismic Lines

Phase I Seismic Lines

Proposed Seismic Lines

Proposed Electric Imaging Lines

S-1 / EI-1N — Geophysical Line End Points

Area Goodland/Walnut Missing

Seep Investigation Area

N

GRAPHIC SCALE IN FEET

0 500 1000 2000

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Figure 2-4

Proposed Geophysical Lines and Existing Paluxy Aquifer Monitoring Wells

NAS FORT WORTH JRB, TEXAS

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Path: NASFWphase-II
Filename: prop-seis-pa-fig2-4.dgn

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Table 2-3
Sample Quantities, Laboratory Analytical Methods and Sample Handling
Phase II Site Inspection at AOC 20 and Data Gaps Investigation at AOC 2
NAS Fort Worth JRB, Texas

Parameter/Method	Matrix	Number of Samples	QA/QC Samples	Container	Preservative	Holding Time
VOCs (USEPA Solid Waste [SW]-846 Method 8260A[USEPA Method 8260A])	soil	18	15	3 pre-tared, 40-ml glass vials with stir bars and Teflon™-lined septa	cool to 4°C	14 days (frozen)
Total Organic Carbon (Walkley-Black Method)	soil	18	13	4-oz glass jar	cool to 4°C	28 days
VOCs (USEPA Method 8260A)	water	50	33	3 x 40-ml glass vials with Teflon-lined septa	HCl to pH<2, cool to 4°C	14 days
Total Suspended Solids (USEPA Method E160.2)	water	50	21	2 x 40-ml glass vials with Teflon-lined septa	cool to 4°C	7 days
Arsenic (USEPA Method 7060A)	water	50	21	100-ml plastic/glass bottle	HNO_3 <2 pH	180 days
Chloride (USEPA Method 9056)	water	50	21	250-ml glass/plastic bottle	cool to 4°C	28 days
Methane, ethane, ethene Campbell et. al., 1989 and 1998 headspace analysis	water	50	21	3 x 50-ml glass /plastic container with Teflon-lined septa and crimp caps	H_2SO_4<2 pH cool to 4°C	28 days
Nitrate (USEPA Method E353 1)	water	50	21	250-ml glass/plastic container	H_2SO_4 <2 pH cool to 4°C	28 days
Sulfate (USEPA Method 9056)	water	50	21	250-ml glass/plastic container	cool to 4°C	28 days
Alkalinity (Standard Methods Method 2320)	water	50	21	100-ml glass container	cool to 4°C	14 days
Total Organic Carbon (USEPA Method 9060)	water	50	21	250-ml glass/plastic container	cool to 4°C	28 days

Field Parameters: pH, dissolved oxygen, redox potential, conductivity, and temperature will be taken measured using a Horiba U-22 water quality meter and ferrous iron (Fe^{2+}) field analysis will be performed using a colorimetric method (Hach kit #26672-00)

HCl hydrochloric acid
HNO_3 nitric acid
H_2SO_4 sulfuric acid
ml milliliter
oz ounce
QA/QC quality assurance/quality control
SW solid waste
USEPA U S Environmental Protection Agency
VOC volatile organic compound

2.3.3 Data Analysis and Reporting

Science Applications International Corporation (SAIC) will review pertinent Environmental Restoration Program Information Management System (ERPIMS) database information, provided by the U.S. Air Force, specific to the area of investigation.

In addition, all the USAF-provided documents applicable to the study area will be reviewed, as will historical use of PCE at the facility. All SB and MW logs in the study area provided by the USAF will be reviewed. Existing seismic data will be reviewed and incorporated into the data analysis.

A Site Characterization Summary Informal Technical Information Report (ITIR) and Draft and Final Site Inspection Report will be submitted that includes the following:

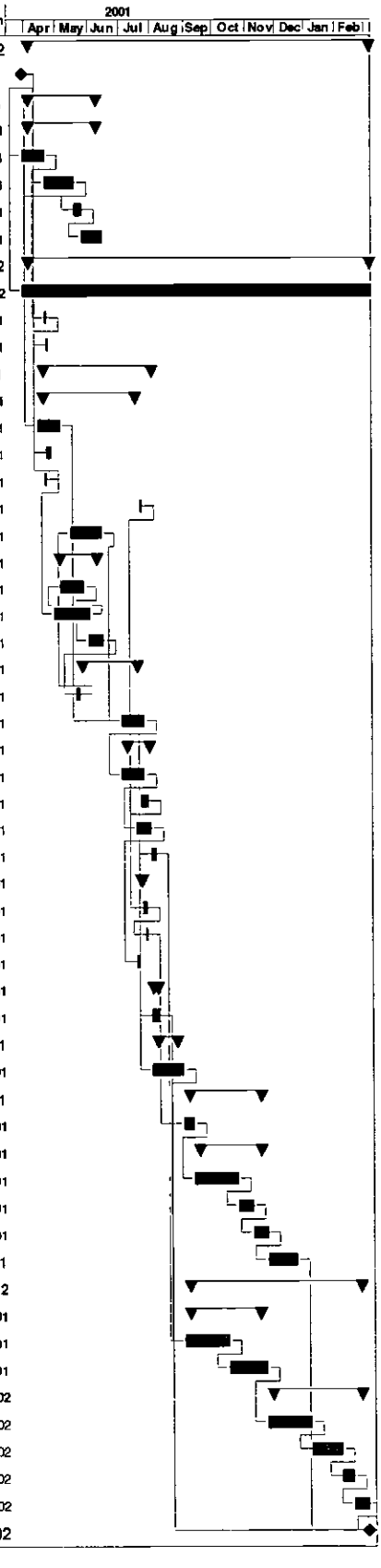
- Summarization of field data (submit seismic and EI survey findings).
- Integration of SB and seismic data to delineate paleochannel(s) or other contaminant pathways.
- Integration of SB and EI data to interpret permeable channel(s) or other contaminant pathways.
- Integration of contaminant plume and channel data to interpret contaminant transport pathways.
- Bedrock elevation contour map.
- TCE Isopleth Map.
- Basal gravel distribution map.
- Terrace alluvium distribution map.
- Conceptual site model.

3. PROJECT SCHEDULE

The activities described in this Work Plan Addendum will be implemented in accordance with the schedule provided in Figure 3-1. The starting date for the field effort will be the date of USAF acceptance of the Work Plan. This schedule will be accelerated as possible with select activities (e.g., procurement of materials and supplies).

Figure 3-1
Project Schedule

Task Name	Dur	Sch Start	Sch Finish
NAS JRB Phase II Site Inspection at AOC 20/AOC 2	240d	03/30/01	03/12/02
NTP	0d	03/30/01	03/30/01
Preparation of Plans	54d	03/30/01	06/14/01
Workplan-SAP, HSP (Addendum)	**54d**	**03/30/01**	**06/14/01**
Draft Work Plan	15d	03/30/01	04/19/01
Air Force Review	20d	04/20/01	05/17/01
Air Force Comments/Comment Responses	5d	05/18/01	05/24/01
Final Work Plan	14d	05/28/01	06/14/01
Project Management	240d	03/30/01	03/12/02
Conduct Project Management and Coordination	**240d**	**03/30/01**	**03/12/02**
Attend Post Award Scoping Meeting (3 people - Non-local)	**1d**	**04/20/01**	**04/20/01**
Prepare Meeting Minutes	**1d**	**04/23/01**	**04/23/01**
Field Investigation	81d	04/13/01	08/07/01
Site Reconnaissance	**70d**	**04/13/01**	**07/23/01**
Field Site Access Coordination And Badging	15d	04/13/01	05/03/01
Land Survey (geophysical line end-points and crossover points)	3d	04/23/01	04/25/01
Field siting and staking of geophysical line endpoints	1d	04/20/01	04/20/01
Walk Over West Fork Trinity River	1d	07/23/01	07/23/01
Utility Clearance Coordination	21d	05/15/01	06/13/01
Conduct Geophysical Investigation	**33d**	**04/30/01**	**06/14/01**
Electric Imaging	16d	05/04/01	05/28/01
Seismic Refraction	24d	04/30/01	06/01/01
Evaluate Geophysical Data	10d	06/01/01	06/14/01
Conduct Geological Investigations (Soils / Sediments)	**45d**	**05/21/01**	**07/24/01**
Stake Boring Locations	2d	05/21/01	05/22/01
Complete soil borings	15d	07/03/01	07/24/01
Conduct Hydrogeological Investigation - GW	**23d**	**07/03/01**	**08/03/01**
Install monitoring wells	15d	07/03/01	07/24/01
Perform Well development	5d	07/23/01	07/27/01
Groundwater Sample Collection	10d	07/18/01	07/31/01
Survey Borings, Well, Seeps and Staff Gauges	3d	08/01/01	08/03/01
Conduct Hydrogeological Investigation - SW	**7d**	**07/18/01**	**07/26/01**
Install Staff Gauge (max 2)	3d	07/24/01	07/26/01
Collect Surface Water Elevation Measurement (max 2)	1d	07/26/01	07/26/01
Sample Collection	1d	07/18/01	07/18/01
Conduct Waste Investigation	**5d**	**08/01/01**	**08/07/01**
Derived Waste Disposal Coordination	5d	08/01/01	08/07/01
Off-site Laboratory Sample Analysis	21d	08/01/01	08/29/01
Analyze Soil & Groundwater samples	**21d**	**08/01/01**	**08/29/01**
Analytical Support/Sample Management/Data Validation	57d	08/30/01	11/19/01
Perform data validation	7d	08/30/01	09/10/01
ERPIMS	50d	09/11/01	11/19/01
Draft Submittal	30d	09/11/01	10/22/01
Air Force Review	10d	10/23/01	11/05/01
Final Submittal	10d	11/06/01	11/19/01
Data Evaluation	20d	11/20/01	12/19/01
Document Assessment	125d	08/30/01	02/28/02
Site Characterization ITIR	**56d**	**08/30/01**	**11/16/01**
Prepare Draft Site Characterization ITIR	30d	08/30/01	10/11/01
Air Force Base Acceptance	26d	10/12/01	11/16/01
SI Report	**69d**	**11/19/01**	**02/28/02**
Compose Draft SI/Data Gap Report	30d	11/19/01	01/03/02
Air Force Base Review	21d	01/04/02	02/04/02
Respond to Draft Comments	8d	02/05/02	02/14/02
Compose Final SI/Data Gap Report	10d	02/15/02	02/28/02
Total Program	0d	02/28/02	02/28/02



TAB

HEALTH AND SAFETY PLAN ADDENDUM

PHASE II SITE INSPECTION AT AOC 20 AND DATA GAPS INVESTIGATION AT AOC 2

NAS FORT WORTH JRB, TEXAS

HEALTH AND SAFETY PLAN ADDENDUM

FINAL

Prepared for

U.S. Air Force Center for Environmental Excellence
Brooks Air Force Base, Texas

Prepared by

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
San Antonio, Texas

Contract No. F41624-00-D-8030
Delivery Order No. 0018

April 2001

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ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base
AFP 4	Air Force Plant 4
FSP	Field Sampling Plan
JRB	Joint Reserve Base
NAS	Naval Air Station

1. INTRODUCTION

1.1 PURPOSE

The *Final Health and Safety Plan* and *Final Work Plan* for AOC 20 Site Inspection, NAS Fort Worth JRB, Texas, Scoping Documents (Contract F41624-00-D-8030-0007), dated November 2000 provides health and safety criteria and procedures that will be used during the Phase 2 Site Inspection at Area of Concern 20 and the Data Gaps Investigation at AOC 2, Naval Air Station Fort Worth Joint Reserve Base, Texas.

1.2 PROJECT ORGANIZATION, PERSONNEL, AND RESPONSIBILITIES

SAIC's personnel organization for this project as presented in Figure 4-1 of the Field Sampling Plan (FSP) Addendum. The project FSP establishes the roles and responsibilities of various project personnel regarding site health and safety. The authority and responsibilities of each SAIC individual utilized for this project are presented in the FSP.

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2. SITE DESCRIPTION INFORMATION

Investigations will be conducted in two areas to delineate preferential groundwater pathways (gravel channels/paleochannels) within the regional trichloroethene (TCE) plume and confirm the presence of tetrachloroethylene (PCE) in groundwater (Figure 1-1 and Figure 1-2). The AOC 20 study area extends from Air Force Plant 4 (AFP 4) in the north to the Base Realignment and Closure (BRAC) boundary in the south at Naval Air Station (NAS) Fort Worth Joint Reserve Base (JRB), former Carswell Air Force Base (AFB), Texas. The second study area is the north lobe of the TCE plume at AOC 2 at the NAS Fort Worth JRB.Locations of both study areas are indicated in Figure 1-2 of the Work Plan Addendum.

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TAB

FIELD SAMPLING PLAN ADDENDUM

PHASE II SITE INSPECTION AT AOC 20 AND DATA GAPS INVESTIGATION AT AOC 2

NAS FORT WORTH JRB, TEXAS

FIELD SAMPLING PLAN ADDENDUM

FINAL

Prepared for

U.S. Air Force Center for Environmental Excellence
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1. INTRODUCTION

The Field Sampling Plan (FSP) presents the requirements and procedures for conducting field operations and investigations. This project-specific FSP has been prepared to ensure that (1) the data quality objectives specified for this project are met, (2) the field sampling protocols are documented and reviewed in a consistent manner, and (3) the data collected are scientifically valid and defensible. This site specific FSP and the Basewide Quality Assurance Project Plan (QAPP) (HydroGeoLogic Inc. 1998) shall constitute, by definition, the Sampling and Analysis Plan.

Sampling and analysis for the Phase II Site Inspection at AOC 20 and Data Gaps Investigation at AOC 2, NAS Fort Worth JRB, Texas will be performed in accordance with the project *Work Plan, Health and Safety Plan, and the Field Sampling Plan* and contained in the *Final Work Plan* for AOC 20 Site Inspection, NAS Fort Worth JRB, Texas, dated November 2000.

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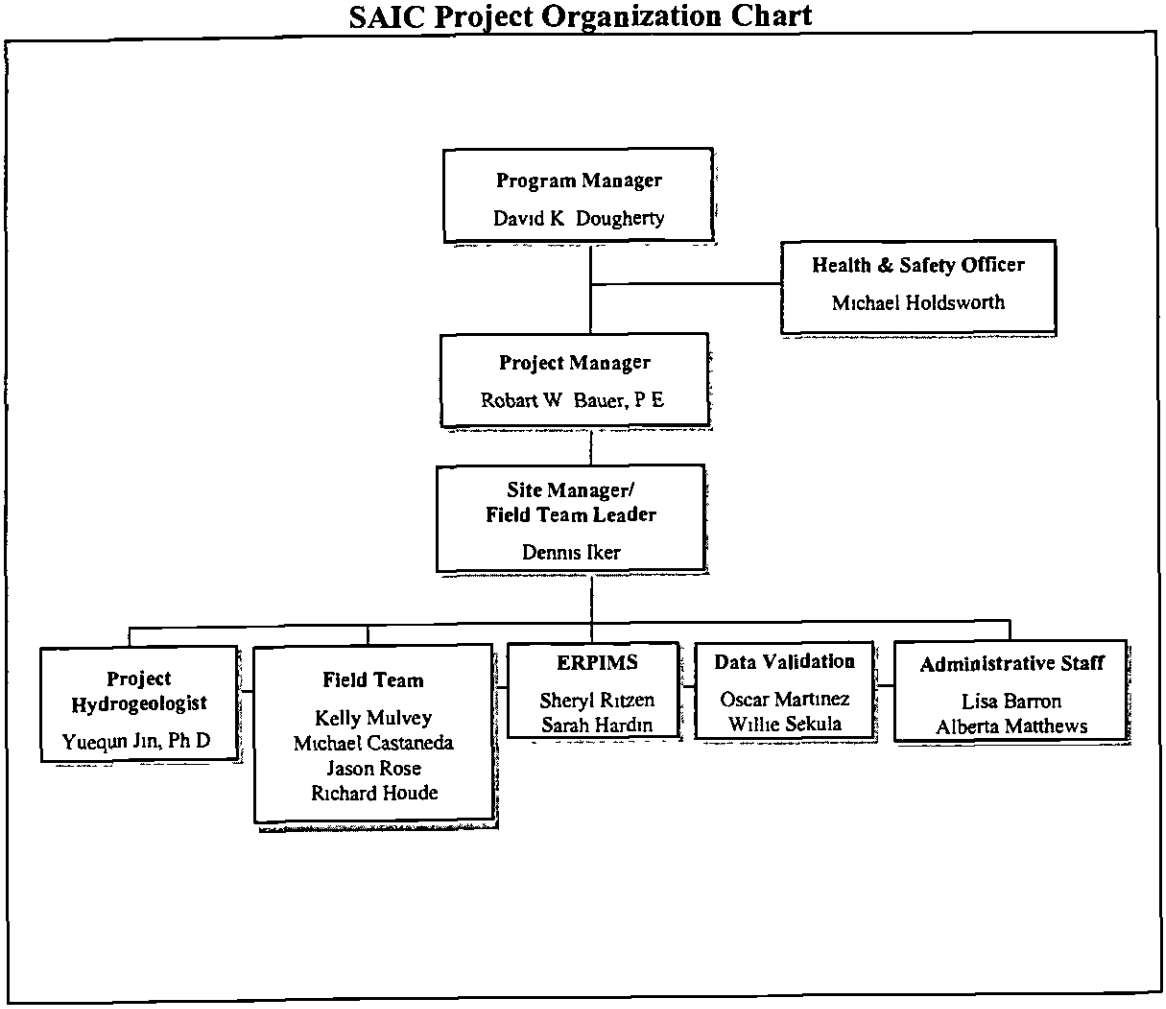
2. PROJECT ORGANIZATION AND RESPONSIBILITY

Figure 2-1 shows the project organization, reporting relationships, and lines of authority. Table 2-1 lists essential project personnel and their respective telephone numbers. Other personnel will be assigned as necessary. The specific responsibilities are described in the following subsections.

Table 2-1
Key Project Personnel

Name	Title	Organization	Telephone
Don Ficklen	Team Chief	AFCEE/ERD	(210) 536-5290
Michael Dodyk	NAS Fort Worth JRB POC	AFCEE/ERD	(817) 782-7167
David K. Dougherty	Program Manager	SAIC	(210) 731-2210
Robart W. Bauer, P.E.	Project Manager	SAIC	(210) 731-2202
Dennis Iker, P.G	Site Manager	SAIC	(210) 731-1455
Oscar Martinez	Data Validation	SAIC	(210) 731-2239
Michael Holdsworth	Health & Safety Officer	SAIC	(210) 731-2283
Yuequn Jin, Ph.D.	Project Hydrogeologist	SAIC	(210) 731-2291

Figure 2-1
SAIC Project Organization Chart



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ADMINISTRATIVE RECORD

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